What is Claimed is:

1. An optical grating device comprising:

a grating arrangement for receiving a different wavelength signal from each of a plurality of radiation sources at separate input ports thereof, and for generating therefrom an output signal of multiplexed wavelengths at a zero diffraction order output port of the grating arrangement, and at least one predetermined wavelength output signal at one of a group consisting of a separate predetermined location in an at least one of a symmetric non-zero diffraction order of the grating arrangement, within the grating arrangement itself, and a combination thereof; and

at least one power tap, each power tap being coupled to the grating arrangement to detect the power of a separate one of the at least one predetermined wavelength output signal therefrom.

2. The optical grating device of claim 1 wherein:

wavelengths of the wavelength signals received from the plurality of radiation sources are sufficiently separated; and

the at least one wavelength output signal from the grating arrangement comprises separate ones of each of the sufficiently separated wavelength output signals received from the plurality of radiation sources that are focused at separate locations within both of a predetermined symmetric non-zero diffraction order of the grating arrangement.

3. The optical grating device of claim 1 wherein:

wavelengths of the wavelength signals received from the plurality of radiation sources are densely spaced; and

the at least one wavelength output signal from the grating arrangement comprises a first and second multiplexed wavelength output signal of the densely spaced apart wavelength signals from the plurality of radiation sources that are focused at separate predetermined locations with first and second ones of a predetermined symmetric non-zero diffraction order, respectively, of the grating arrangement.

4. The optical grating device of claim 3 wherein:

the at least one power tap comprises a first and a second power tap to receive the first and second multiplexed wavelength output signals, respectively, that are focused in the respective first and second ones of a predetermined symmetric non-zero diffraction order of the grating arrangement where the power obtained by each power tap is dependent on angular dispersion and a wavelength range generated by the plurality of radiation sources.

5. The optical grating device of claim 1 wherein the grating arrangement is an Arrayed Waveguide Grating (AWG) comprising:

a first Free Propagating Region (FPR) for receiving the different wavelength signals from the plurality of radiation sources at separate input ports at an input side thereof;

a second FPR comprising an input and an output side thereof; and

a grating array formed from a plurality of different length optical waveguides that couple an output side of the first FPR to the input side of the second FPR for causing the second FPR to generate both of the multiplexed wavelength output signal from the plurality of radiation sources at the zero diffraction order and said focused at least one predetermined wavelength output signal.

6. The optical grating device of claim 5 wherein the at least one predetermined wavelength output signal comprises first and second multiplexed wavelength output signals from the plurality of radiation sources that are obtained at a first and second waveguide, respectively, forming the plurality of different length optical waveguides of the grating array and coupled to respective first and second power taps.

7. The optical grating device of claim 6 wherein wavelengths of the different wavelength output signals from the plurality of radiation sources are sufficiently separated and each of said different wavelength output signals are focused at separate locations within an area of at least one of a set of predetermined symmetric non-zero diffraction orders at the second FPR and coupled to separate power taps.

8. The optical grating device of claim 6 wherein one of the first and second multiplexed wavelength output signals from the first and second optical waveguides of the grating array is fed back to an input port of the first FPR which is separated from the input ports of the plurality of radiation sources for causing each of the different wavelength output signals from the

plurality of radiation sources to be demultiplexed and focused at separate locations within an area of one of a set of predetermined symmetric non-zero diffraction orders at the second FPR and coupled to separate power taps.

9. The optical grating device of claim 1 wherein:

wavelengths of the wavelength signals received from the plurality of radiation sources are densely spaced apart;

the at least one wavelength output signal from the grating arrangement comprises a multiplexed wavelength output signal of the densely spaced apart wavelength signals from the plurality of radiation sources that is focused at a separate predetermined location within a first one of a first set of predetermined symmetric non-zero diffraction orders of the grating arrangement: and

the optical grating device further comprises:

a feedback loop for receiving the multiplexed wavelength output signal focused at the separate predetermined location within the first one of the first set of predetermined symmetric non-zero diffraction orders and feeding it back into the grating arrangement at a location adjacent the zero diffraction order output port for demultiplexing the multiplexed wavelength output signal and resolving each wavelength of the multiplexed signal to a separate input port of the grating arrangement that is not coincident with the input ports receiving the wavelength signals from the plurality of radiation sources and coupled to separate power taps.

10. The optical grating device of claim 9 wherein the at least one wavelength output signal from the grating arrangement comprises said multiplexed wavelength output signal focused within the first one of the first set of predetermined symmetric non-zero diffraction orders, and first and second multiplexed wavelength output signals from the plurality of radiation sources that are focused within each of a second set of predetermined symmetric non-zero diffraction orders and coupled to separate power taps.

11. An optical grating device comprising:

a grating arrangement for receiving widely spaced apart wavelength signals from a plurality of radiation sources at separate input ports thereof, and for generating therefrom a multiplexed wavelength output signal at a zero diffraction order output port of the grating arrangement, and separate ones of each of the widely spaced different wavelength output signals from the plurality of radiation sources that are focused at separate predetermined spaced apart locations within both areas of a set of predetermined symmetric non-zero diffraction orders of the grating arrangement; and

a plurality of power taps, each power tap being coupled to detect the power of a separate one of the widely spaced apart wavelength output signals from the plurality of radiation sources that are focused at the separate predetermined spaced apart locations within both of the predetermined symmetric non-zero diffraction orders.

12. The optical grating device of claim 11 wherein the grating arrangement is an Arrayed Waveguide Grating (AWG) comprising:

a first Free Propagating Region (FPR) for receiving the widely spaced apart wavelength output signals from the plurality of radiation sources at separate input ports at an input side thereof;

a second FPR comprising an input and an output side thereof; and

a grating array formed from a plurality of different length optical waveguides that couple an output side of the first FPR to the input side of the second FPR for causing the second FPR to generate both the multiplexed wavelength output signal from the widely spaced apart signals at the zero diffraction order and the focused widely spaced different wavelength output signals.

13. An optical grating device comprising:

a grating arrangement for receiving each of densely spaced apart wavelength output signals from a plurality of radiation sources at separate input ports thereof, and for generating therefrom a multiplexed wavelength output signal at a zero diffraction order output port of the grating arrangement, and first and second multiplexed wavelength output signals of the densely spaced apart wavelength output signals that are focused at separate predetermined locations within first and second ones of a predetermined symmetric non-zero diffraction order, respectively, of the grating arrangement; and

first and second power taps coupled to detect the power of the first and second multiplexed wavelength output signals focused within the first and second ones of the predetermined symmetric non-zero diffraction order, respectively, of the grating arrangement.

14. The optical grating device of claim 13 wherein the grating arrangement is an Arrayed Waveguide Grating (AWG) comprising:

a first Free Propagating Region (FPR) for receiving the wavelength output signals from the plurality of radiation sources at separate input ports at an input side thereof;

a second FPR comprising an input and an output side thereof; and

a grating array formed from a plurality of different length optical waveguides that couple an output side of the first FPR to the input side of the second FPR for causing the second FPR to generate both the multiplexed wavelength output signal from the plurality of radiation sources at the zero diffraction order and the focused first and second multiplexed wavelength output signals.

15. An optical grating device comprising:

a grating arrangement for receiving a different wavelength output signal from each of a plurality of radiation sources at separate input ports thereof, and for generating therefrom a first multiplexed wavelength output signal at a zero diffraction order output port of the grating arrangement, the grating arrangement comprising a feedback loop for coupling a

second multiplexed wavelength output signal appearing at a non-zero diffraction order output port of the grating arrangement back into the grating arrangement adjacent the zero diffraction order output port so that each of the different wavelength output signals in the second multiplexed output signal are demultiplexed and focused to separate input ports of the grating arrangement that are not coincident with the input ports receiving the wavelength signals from the plurality of radiation sources; and

a plurality of power taps, each power tap being coupled to the grating arrangement to detect the power of a separate one of the different wavelength output signals focused at said separate input ports thereof.

16. An optical grating device comprising:

a grating arrangement that is an Arrayed Waveguide Grating (AWG) comprising:

a first Free Propagating Region (FPR) for receiving a different wavelength output signal from each of a plurality of radiation sources at separate input ports at an input side thereof;

a second FPR comprising an input and an output side thereof; and

a grating array formed from a plurality of different length optical waveguides that couple an output side of the first FPR to the input side of the second FPR for generating both a first multiplexed wavelength output signal from the different wavelength output signals received from the plurality of radiation sources at a zero diffraction order of the second

FPR, and a second multiplexed wavelength output signal at a first predetermined waveguide forming the plurality of different length optical waveguides of the grating array; and

a first power tap coupled to receive the multiplexed wavelength output signal from said predetermined waveguide forming the plurality of different length optical waveguides of the grating array.

17. The optical grating device of claim 16 wherein:

the grating array further generates a third multiplexed wavelength output signal at a second predetermined waveguide forming the plurality of different length optical waveguides of the grating array; and

a second power tap coupled to the second predetermined waveguide forming the plurality of different length optical waveguides of the grating array.

18. The optical grating device of claim 16 wherein:

the grating array further generates a third multiplexed wavelength output signal at a second predetermined waveguide forming the plurality of different length optical waveguides of the grating array which is looped back into an input port of the first FPR that is not coincident with any of the input ports used to receive the different wavelength output signals from the plurality of radiation sources for causing each of the different wavelength output signals in the third multiplexed wavelength output signal to be demultiplexed and focused at separate locations within an area of one of a set of predetermined symmetric non-zero diffraction orders at the second FPR; and

the grating device further comprises a plurality of second power taps, each second power tap coupled to receive a separate one of the focused different wavelength output signals in the third multiplexed wavelength output signal at the separate locations within said area of the one of the set of predetermined symmetric non-zero diffraction orders.

19. In combination:

optical grating means including input means for receiving signal power of different optical wavelengths from each of a plurality of radiation sources and output means for providing one of a group consisting of multiplexed power and individual power of the different optical wavelengths, the output means including a zero-order diffraction area and at least one non-zero order diffraction area;

main output means coupled to said zero-order diffraction area for abstracting said multiplexed power in an output signal of the optical grating means; and

auxiliary output means coupled to the at least one of non-zero diffraction area for abstracting power of one of the group consisting of the multiplexed power and individual powers of the different optical wavelengths.

20. The combination of claim 19 wherein:

wavelengths of the different wavelength signals received from the plurality of radiation sources are widely spaced apart; and

the auxiliary output means are coupled to both of a predetermined symmetric non-zero diffraction order area for

abstracting power of the individual different optical wavelengths at separate locations within each of the predetermined symmetric non-zero diffraction order areas.

21. The combination of claim 19 wherein:

wavelengths of the different wavelength signals received from the plurality of radiation sources are densely spaced apart; and

the auxiliary output means are coupled to both of a predetermined symmetric non-zero diffraction order area for abstracting power of the multiplexed power at a location within each of the predetermined symmetric non-zero diffraction order areas where the power obtained by each auxiliary means is dependent on angular dispersion and a wavelength range generated by the plurality of radiation sources.